3 AFFECTED ENVIRONMENT

This chapter describes the environmental conditions of the proposed project area that could be affected by the construction, operation, and maintenance of the NRI alternative routes described in Chapter 2.[1] Information is presented on climate, air quality, geology, seismicity, soils, land use, hydrological resources, ecological resources, cultural resources, socioeconomic resources, environmental justice considerations, and visual resources. Information on noise and human health is included in the corresponding sections in Chapter 4.

The environmental conditions of all four alternative routes are identical for the first 12.2 mi (19.6 km) leading out of the Orrington Substation (Figure 2.1-2). After this segment, the Modified Consolidated Corridors, Consolidated Corridors, and Previously Permitted Routes would have similar environmental conditions. Portions of the alternative routes would be identical, while other portions would occur within a similar area that generally parallels Stud Mill Road (Figures 2.1-1 through 2.1-3). In contrast, most of the MEPCO South Route is not located within the same general area as the other alternative routes (Figure 2.1-1). Therefore, the affected environment of the MEPCO South Route would be the most dissimilar to that of the other alternative routes.

3.1 ATMOSPHERIC ENVIRONMENT

Construction of the proposed project may affect local air quality. Because as much of the construction as possible (regardless of alternative route) would occur in winter, climate differences among the alternative routes may affect construction schedules and any related air quality impacts.

3.1.1 Weather and Climate

Climatic conditions are important because they may affect construction schedules, fugitive dust generation, and so forth. The project area has warm to hot summers and relatively cold winters. The climate of the general project area (east-central Maine) is highly variable and subject to extreme ranges in temperature (diurnal and annual) and considerable diversity in weather from place to place. Minor climatic differences may occur along portions of the MEPCO South Route compared with the other alternative routes because it proceeds farther north than the other alternative routes (Figure 2.1-1). For example, a slight increase could be expected in both the number of days of subzero temperatures and the amount of snowfall (Gale Research Company 1985).

The average annual temperature in Maine is about 44ºF (6.7°C), with the highest recorded temperature reaching 105ºF (40.6°C) and the lowest dropping to −48ºF (−44.4°C).

[1] Unless cited otherwise, the information presented on the affected environment in the project area has been derived from information provided by DOE (1995) or BHE (2004, 2005).

Temperatures reach 90ºF (32.2°C) or more on an average of 2 to 7 days per year. The average length of the growing season is about 120 to 140 days. The last freezing temperature generally occurs in early May; the freeze-free season generally ends in September.

Annual precipitation in the project area averages 40.8 in. (103.6 cm) at Orono (western portion of alternative routes just south of Bradley) to 44.9 in. (114.0 cm) near Baileyville (eastern portion of alternative routes). Monthly precipitation totals can range from negligible to 10 in. (25 cm) or more. Measurable precipitation of 0.01 in. (0.025 cm) or more occurs on average 160 days per year. Storm systems are the main year-round moisture producers in Maine. Such systems are somewhat less active in summer. Thunderstorms occur 15 to 30 days per year. They can produce 1 to 2 in. (2.5 to 5 cm) of rain an hour and may result in minor washouts of roads and soil erosion. Flash floods occasionally occur in smaller streams during the summer. Floods most frequently occur in early spring when substantial rains and melting snow combine to produce heavy runoff. However, snowmelt is usually gradual enough to prevent serious flooding. Thus, widespread flooding is infrequent. Winter precipitation occurs primarily as snow. The range of regional snowfall for the NRI project area for the 2003 to 2004 season was between 26 and 75 in. (66 and 190 cm) (there is a seasonal increase of about 1 in. [2.5 cm] of snowfall for each 25-ft [7.6-m] increase in elevation). One or more inches of snow occurs on 20 to 30 days per year, with several yearly snowstorms of 5 in. (13 cm) or more. The snowfall season generally starts late October to early November and lasts until April or sometimes May. The snowiest month is January, which averages more than 20 in. (51 cm) of snow. Extended dry spells can occur in late summer or fall, creating potential forest fire hazards.

The equivalent water content of snowpack is the amount of water contained in the snow that is on the ground. Water in the snowpack will run off into streams, rivers, and lakes and recharge the groundwater system when it melts (Loiselle and Hodgkin 2002). The maximum observed water content was between 12 and 16 in. (30.5 and 40.6 cm) over much of Maine, whereas mean water content was between 5 and 7 in. (12.7 and 17.8 cm) (Loiselle and Hodgkin 2002). Most of the project area lies within the 14-in. (35.6-cm) maximum observed equivalent water content contour and between the 4- and 5-in. (10.2- and 12.7-cm) mean equivalent water content contours (Loiselle and Hodgkin 2002).

3.1.2 Air Quality

Air quality in a given area is a function of the air pollutant emissions in that area (e.g., type of pollutant, rate, frequency, duration, and location of release), atmospheric conditions, characteristics of the area itself (size of air shed and topography of the area), and the presence of pollutants transported from outside the area.

The Clean Air Act (CAA) established the principal framework for national, state, and local efforts to protect air quality in the United States (*United States Code*, Title 42, Sections 7401–7642 [42 USC §§ 7401–7642]). Under the CAA, the EPA has set standards known as National Ambient Air Quality Standards (NAAQS) for six criteria pollutants considered to be key indicators of air quality, namely, carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), sulfur dioxide (SO_2), lead (Pb), and two categories of particulate matter

(PM_{10} and $PM_{2.5}$)[2] (Table 3.1-1). The NAAQS define concentration levels of air quality, with an adequate margin of safety, that protect the public health, including the health of sensitive populations such as asthmatics, children, and the elderly. National secondary ambient air quality standards define levels of air quality judged necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings. The EPA is responsible for ensuring that these air quality standards are met or attained in cooperation with State, Tribal, and local governments. As delegated by the EPA, the MDEP's Bureau of Air Quality is responsible for protecting Maine's air quality.

Air Quality Standards

National Ambient Air Quality Standards (NAAQS) are established by the EPA for criteria pollutants for the purpose of protecting public health and welfare as required by the CAA.

Prevention of Significant Deterioration (PSD) is an air pollution permitting program for new or modified sources designed to ensure that ambient air quality does not degrade beyond the NAAQS levels or beyond specified incremental amounts above prescribed base levels.

Conformity of General Federal Actions requires that no department, agency, or instrumentality of the Federal government shall engage in, support in any way, provide financial assistance for, license or permit, or approve any activity that does not conform to an applicable state implementation plan (40 CFR 51, Subpart W).

Areas that meet the NAAQS are said to be in "attainment." The air quality in attainment areas is managed under the Prevention of Significant Deterioration (PSD) Program of the CAA. The goal of this program is to maintain a level of air quality that continues to meet the standards. Areas that do not meet one or more of the standards are designated as "nonattainment" areas for criteria pollutant(s). For regulatory purposes, remote or sparsely populated areas that have not been monitored for air quality are listed as "unclassified" and are considered to be in attainment. Overall, the air quality along the proposed routes is considered good because of the rural character of the area and the small incidence of major pollutant sources (BHE 2004,2005). The project area is currently characterized as being in attainment with NAAQS (EPA 2004a,b).

3.2 LAND FEATURES

This section summarizes the topography, geology, seismicity, and soil conditions in the project area. This information is used for evaluating how water and potential contaminants move through the subsurface, evaluating erosion impacts, and predicting subsidence or landslides. Information about seismicity is used to determine potential impacts on the proposed project from earthquakes.

[2] PM_{10} = particulate matter with a mean aerodynamic diameter of 10 micrometers (μm) or less, which is considered respirable; $PM_{2.5}$ = particulate matter with a mean aerodynamic diameter of 2.5 μm or less. Both are significant contributors to haze. Smaller particles are generally considered to be more harmful to human health because they can penetrate more deeply into the lungs than larger particles and tend not to be expurgated or expectorated. A μm is one millionth of a meter.

TABLE 3.1-1 National and State of Maine Air Quality Standards

Pollutant	Averaging Time	National (and Maine) Primary Standards	National Secondary Standards
SO_2	Annual arithmetic mean	0.03 ppm (0.022 ppm)	–[a]
	24 hours	0.14 ppm (0.088 ppm)	–
	3 hours[b]	0.05 ppm (0.0439 ppm)	0.5 ppm
$PM_{2.5}$	Annual[c] (3-year average)	15 $\mu g/m^3$ (–)	Same as primary
	24 hours[d]	65 $\mu g/m^3$ (–)	–
PM_{10}	Annual arithmetic mean[e]	50 $\mu g/m^3$ (40 $\mu g/m^3$)	Same as primary
	24 hours[b]	150 $\mu g/m^3$ (150 $\mu g/m^3$)	–
CO	8 hours[b]	9 ppm (9 ppm)	–
	1 hour[b]	35 ppm (35 ppm)	–
O_3	8 hours[f]	0.08 ppm (–)	Same as primary
	1 hour[g]	0.12 ppm (0.12 ppm)	Same as primary
NO_2	Annual arithmetic mean	0.053 ppm (0.053 ppm)	Same as primary
Pb[h]	Quarterly average	1.5 $\mu g/m^3$ (1.5 $\mu g/m^3$)	Same as primary

[a] A dash indicates that no standard exists.

[b] Not to be exceeded more than once per year.

[c] To attain this standard, the expected annual arithmetic mean $PM_{2.5}$ concentrations from single or multiple community-orientated monitors must not exceed 15.0 $\mu g/m^3$.

[d] To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-orientated monitor within an area must not exceed 65 $\mu g/m^3$.

[e] To attain this standard, the expected annual arithmetic mean PM_{10} concentration at each monitor within an area must not exceed 50 $\mu g/m^3$.

[f] To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average O_3 concentrations measured at each monitor within an area over each year must not exceed 0.08 part per million (ppm).

[g] The standard is attained when the expected number of days per calendar year with maximum hourly concentrations above 0.12 ppm is ≤ 1 as determined by 40 CFR Part 50, Appendix H.

[h] Ambient air monitoring for lead has been discontinued in Maine because the concentration of lead in air is well below the NAAQS.

Sources: EPA (2004b); MDEP (2005).

3.2.1 Surface Topography

The surface topography of the project area is dominated by glacially sculpted remnants, such as drumlins, kames, and eskers,[3] along with bedrock outcropping. Most of the area crossed by the alternative routes is characterized by low-to-moderate relief with broad ridges, shallow sweeping valleys, and occasional mountains with elevations ranging from 150 to 1,500 ft (46 to 457 m) above mean sea level.

Physiography and Geology

Physiography is the physical geography of an area, or the description of its physical features.

A *physiographic province* is a region in which the landforms are similar in geological structure and differ significantly from the landform patterns in adjacent regions.

Geology deals with the materials that make up the planet earth and the processes that act on them.

The terrain crossed by the alternative routes changes from east to west. In the east, the terrain is characterized by the flat lowland of the St. Croix River valley and a few knobs of exposed bedrock outcrops. The terrain rises in a westerly direction, and the number of bedrock outcrops (many in the form of mountains and ridges) increases.

Landslides would not pose potential hazards to a transmission line in the project area because of the relatively flat terrain crossed by the proposed route. No landslides are known from the project area. Ground subsidence would not be a hazard because the rock types in the project area are not susceptible to dissolution and there are no underground mines in the area (FERC 1998).

3.2.2 Bedrock Geology

Sedimentary, igneous, and metamorphic rocks are the three main types of bedrock found in the project area. More than 75% of the project area is underlain by sedimentary rocks (e.g., sandstones, siltstones, and limestones) and metamorphic rocks (e.g., slate) of Silurian and Devonian ages. These two types of bedrock occur primarily in the eastern and western ends of the project area. In the central portion of the project area, the bedrock is primarily igneous rocks of Devonian age (e.g., granites). In the project area, the bedrock is either exposed or buried by a layer of glacial till at depths up to 50 ft (15 m).

3.2.3 Surficial Geology

The surficial geology of the project area is dominated by glacial till. The glacial till is a heterogeneous mixture of sand, silt, clay, and boulders that was deposited during the retreat of the last glaciers approximately 13,000 years ago during the Wisconsinan Glaciation.

[3] Drumlins are elongated or oval hills of glacial till; kames are short ridges, hills, or mounds of stratified drift deposited by glacial meltwater; and eskers are long, narrow ridges or mounds of sand, gravel, and boulders deposited by a stream flowing on, within, or beneath a stagnant glacier.

Several glaciofluvial channels and their associated eskers are crossed by the alternative routes, including the Sunkhaze Stream, the Narraguagus River, and the Machias River (Figure 2.1-1). Prominent esker segments in the area include the Whalesback and the Horseback (Figure 2.1-1). The eskers and glaciofluvial channels usually contain coarse-grained sand and gravel. Glaciomarine deposits were laid down in the St. Croix and Penobscot River valleys after the last glacier retreated. These deposits are commonly composed of clayey silts and present a flat to gently sloping landscape.

Rock Types

Sedimentary: Rocks formed by consolidation of loose sediment that has accumulated in layers through deposition by wind, water, or ice. Sandstone is an example.

Igneous: Rocks formed by the solidification of molten magma. Examples are *volcanics* (rocks formed near the earth's surface by the rapid cooling of molten magma from a volcano) and *intrusives* (formed when molten material solidified deep in the earth). Examples are basalt (a volcanic) and granite (an intrusive).

Metamorphic: Rocks formed from preexisting rocks by mineralogical, structural, and chemical changes in temperature, pressure, and shearing stress. Metamorphism occurs deep in the earth's crust, below the zone of weathering and sedimentation. Metamorphic rocks are sometimes referred to simply as *metamorphics*. An example is slate.

Mineral resources within the project area include widely distributed deposits of sand, gravel, clay, and crushed and dimension stone (FERC 1998).

Soil types in the project area vary widely, ranging from excessively drained gravels to very poorly drained swamps and bogs. In addition, organic soils occur in depressions and lowlands within glacial till, glaciofluvial, and glaciomarine areas, and thin drift occurs in areas of outcrops and bedrock (Table 3.2-1). Figure 3.2-1 shows the surficial geology that occurs along the alternative routes.

TABLE 3.2-1 Soil Types Occurring in the Project Region

Soil Type	Description
Glacial till	A mixture of sand, silt, clay, and stones forming sandy loam, stony loam, or stony silty loam. Found on hills, ridges, and till plains.
Glaciomarine sediments	Silt, clay, and local sand, forming silty loam, fine sand loam. Found mainly on coastal lowlands and major river valleys.
Thin drift	Thin surficial deposits overlying bedrock or outcrops; soil may contain a high percentage of bedrock fragments or stone.
Glaciofluvial materials	Near previous drainage channels and eskers, composed of sand and gravel.
Organic soils	Peat, muck, clay, and silts in swamps, marshes, bogs, and floodplains along rivers and streams.

Source: DOE (1995).

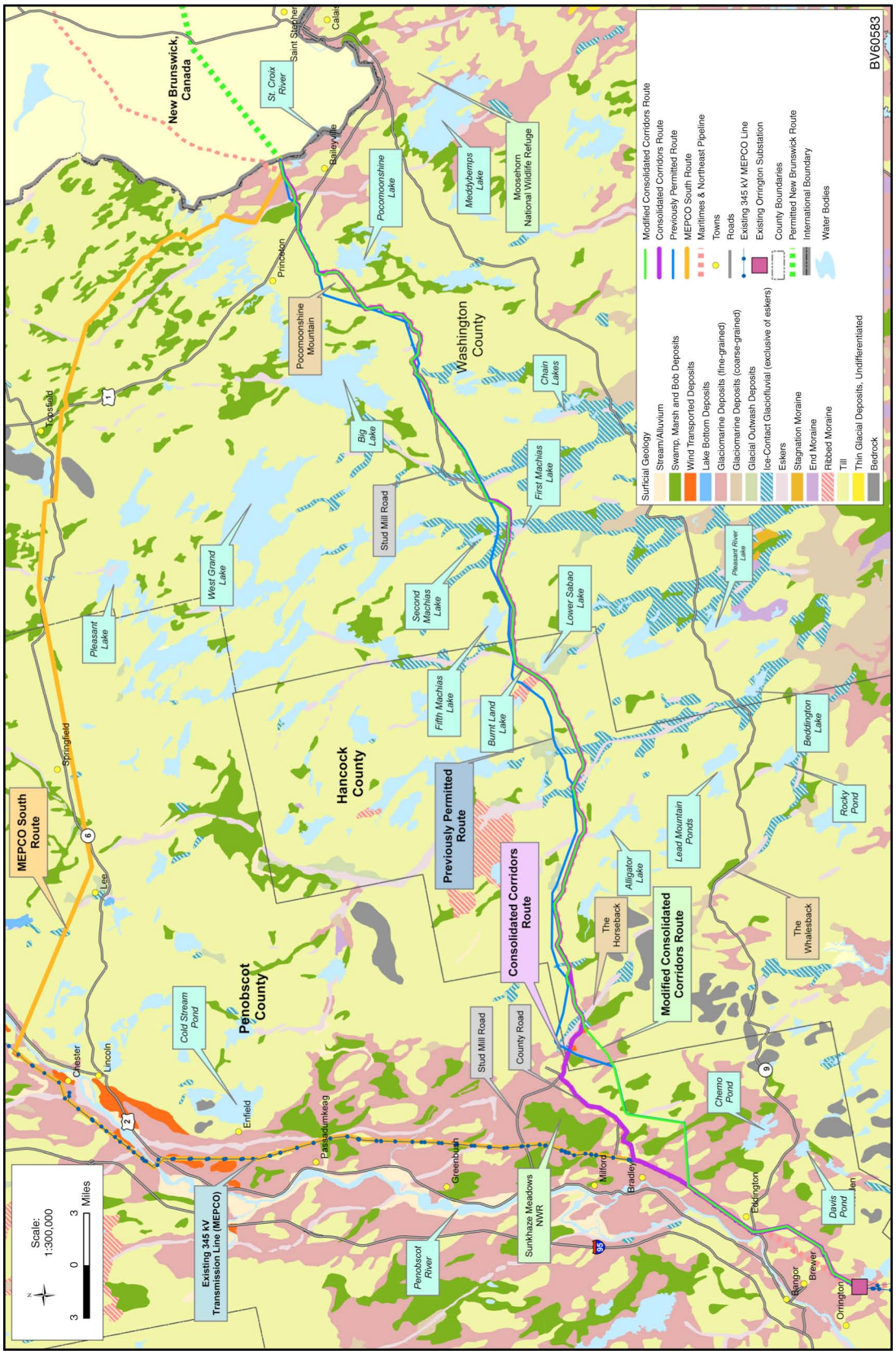

FIGURE 3.2-1 Surficial Geology in the Region of the Alternative Routes

3.2.4 Seismicity Hazards

Earthquakes have been reported from all counties in Maine (including those through which the NRI would cross) (Berry 2001). The largest historic earthquake in Maine occurred near Eastport in 1904, with a Modified Mercalli Intensity estimated at VII. The largest measured earthquake was on June 15, 1973, just on the Quebec side of the border with northern Oxford County, Maine; it had a Richter magnitude of 4.8. Events with magnitudes of less than 5 typically do not cause property damage. Most earthquakes are of small magnitude, and no Maine earthquake has caused significant damage (Berry 2001). The NRI would be located within an area where no structural damage from an earthquake would be expected (DOE 1995).

Modified Mercalli Intensity Scale

The Modified Mercalli Intensity Scale is a measure of the shaking strength of an earthquake at different locations in the region where an earthquake is felt. Earthquake intensities are characterized in terms of how the shaking affects people and buildings. The scale has 12 degrees of shaking, with XII being the most severe.

Richter Scale

The magnitude of an earthquake is a measure of the energy released during the event. It is measured on the Richter scale, which runs from 0.0 upwards, with the largest earthquake recorded having a magnitude of 8.6. The Richter scale is logarithmic, so a quake of magnitude 5.0 is 10 times more destructive than a quake of magnitude 4.0. Earthquakes greater than magnitude 6.0 can be regarded as significant, with the likelihood of damage to nearby structures not designed to withstand such forces.

3.3 LAND USE

This section covers land use, land ownership, and land use planning for areas covered by the alternative routes. Generally, land uses within the project area consist of forested timberlands; agricultural lands; residential, commercial, and industrial lands; recreational lands; and infrastructure (transportation and utility corridors).

Many portions of the NRI project area fall under the jurisdiction of the Maine Land Use Regulation Commission (LURC), which provides planning and zoning authority to the State's unorganized territories, comprised of more than 10 million acres (4 million ha) of the State of Maine that are largely undeveloped.

3.3.1 Forestry

About 17.7 million acres (7.2 million ha) or 90% of the State of Maine is forest land. All but 3% of this amount is classified as timberland (forest land capable of producing commercial crops of wood and not restricted from harvest) (McWilliams et al. 2005). The area of forest land in Maine has remained stable since the 1970s. Most of Maine's forests are naturally regenerated stands that are managed extensively. Approximately 562,000 acres (227,000 ha) are harvested annually (McWilliams et al. 2005). Harvesting rotation intervals are 20 to 80 years (McWilliams et al. 2005).

Approximately 92% of the three-county NRI project area is forested, and 97% of this is classified as timberlands (Table 3.3-1).

TABLE 3.3-1 Areas of Land Classifications (acres[a]) by County

County	Timberland	Reserved and Unproductive Forest	Total of Forested Land[b]	Nonforested Land	Total Land Area[b]
Hancock	855,500	61,200	916,800	99,400	1,016,100
Penobscot	1,958,700	42,500	2,001,200	172,100	2,173,300
Washington	1,481,300	48,200	1,529,500	114,300	1,643,800
Totals	4,295,500	151,900	4,447,500	385,800	4,833,200

[a] To convert acres to hectares, multiply by 0.405.

[b] Totals may not add up due to rounding.

Source: McWilliams et al. (2005).

Commercial forestry (for timber, pulp, and paper production and biomass for energy production) is the dominant land use within forested lands, accounting for approximately 34% of the 2002 Maine gross state product (NEFSA 2004). Forest lands also provide recreational opportunities, as well as wildlife habitat and watershed protection (LURC 1997).

As indicated in Table 3.3-2, most of the forested land within the three counties is privately owned and controlled primarily by land management and pulp and paper companies (LURC 1997). Approximately 5% of the forested land in the three-county area is Federal, Tribal, State, or local government land.

3.3.2 Agriculture

In the 2002 Census of Agriculture (USDA 2004), there were 1,292 farms on 309,150 acres (125,109 ha) of land in Hancock, Penobscot, and Washington Counties. This represents approximately 6% of the total three-county area. This acreage includes cropland, woodland crops (such as Christmas trees and maple trees for syrup), orchards, pastures, and rangelands. The average farm size in these three counties ranges from approximately 150 to 380 acres (61 to 154 ha), with the median size ranging from 70 to 100 acres (28 to 40 ha) (USDA 2004). Within the three-county area, high-quality farmland (areas with higher than statewide averages of prime or unique farmlands) occurs primarily within the Penobscot River basin (American Farmland Trust 1996). For example, Penobscot County has an estimated 113,836 acres (48,068 ha) of prime farmland compared with only 16,491 acres (6,674 ha) for Washington County (Maine.gov 2003a,b). However, the Penobscot River basin is also experiencing a high rate of urban conversion (American Farmland Trust 1996).

While agriculture is limited in Maine because of the limited presence of suitable soils, the distance to markets, and the expanse and importance of forest products (LURC 1997), two major agricultural crops in the project area are blueberries and cranberries, with much of the production occurring in Washington County (LURC 1997; University of Maine Cooperative Extension 2005).

TABLE 3.3-2 Forested Land Ownership (acres[a]) by County

County	Federal Land	State or Local Government Land	Forest Industry	Nonindustrial Private	Total
Hancock	28,000	36,000	328,900	523,900	916,800
(timberland only)	0	36,000	323,100	496,400	855,500
Penobscot	0	81,300	716,800	1,203,000	2,001,100
(timberland only)	0	69,600	708,900	1,180,200	1,958,700
Washington	36,000	36,500	387,900	1,069,100	1,529,500
(timberland only)	30,800	30,900	373,800	1,046,100	1,481,600

[a] To convert acres to hectares, multiply by 0.405.

Source: McWilliams et al. (2005).

For example, Washington County accounted for almost 81% of the statewide cranberry harvest from 2001 to 2004 (University of Maine Cooperative Extension 2005). Nearly all of the agricultural lands that would be crossed by the alternative routes are currently crossed by existing transmission lines (BHE 2004).

3.3.3 Other Uses

Residential, urban (developed), commercial, industrial, and nonforested lands, as well as transportation and utility corridors, cover the remaining types of land use within the three-county area and would account for no more than 8% of all the land use types that would be crossed by any of the alternative routes. Most of the residential and commercial development occurs near the Bangor metropolitan area and along the I-95 corridor. Most commercial and industrial development in the project area is in support of the forest industry. In the general vicinity of the project area, the Maine Army National Guard has used portions of land owned by International Paper and the State to conduct training exercises.

The number of dwellings (excluding seasonal camps) within 600 ft (183 m)[4] of any of the alternative routes ranges from 35 for the Previously Permitted Route to 121 for the MEPCO South Route (Table 3.3-3). Most of the dwellings along the Modified Consolidated Corridors, Consolidated Corridors, and Previously Permitted Routes are in the towns of Brewer, Holden,

[4] Distances of 300 ft (91 m) and 600 ft (183 m) of dwellings from the ROW are used for purposes of impacts evaluation because electrical utilities in Maine have condemnation rights; however, those rights are precluded if there is a dwelling within 300 ft (91 m) of land that is being considered for condemnation, even if the land being considered is not owned by the owner of the dwelling. The 600-ft (183-m) distance was selected during BHE's stakeholder process, for the purpose of evaluating visual impacts on landowners (Paquette 2005ll), and has been accepted by DOE as reasonable.

TABLE 3.3-3 Number of Dwellings and Camps Present near the Proposed ROWs

	Alternative Routes[a]			
Distance from ROW	MCCR	CCR	PPR	MSR
Dwellings				
0 to 300 ft[b]	10	20	10	47
300 to 600 ft	26	39	25	74
Camps[c]				
0 to 300 ft	4	0	0	0
300 to 600 ft	0	0	4	0

[a] CCR = Consolidated Corridors Route, MCCR = Modified Consolidated Corridors Route, MSR = MEPCO South Route, PPR = Previously Permitted Route.

[b] To convert feet to meters, multiply by 0.305.

[c] Seasonal campground buildings.

Source: Paquette (2005x).

and Eddington, and for the Consolidated Corridors Route, are also in the towns of Bradley and Milford. The dwellings near the MEPCO South Route also occur within these towns, as well as within Greenbush, Passadumkeag, Enfield, Chester, Lincoln, Lee, and Springfield.

Native Americans own and use lands present in the three-county area, including lands owned by the Passamaquoddy Tribe and the Penobscot Indian Nation (Figure 2.1-1). Approximately 4 acres (1.6 ha) of submerged Native American lands belonging to the Penobscot Indian Nation would be crossed by the MEPCO South Route along the Penobscot River. No other Native American lands would be crossed by the other alternative routes (BHE 2004; Paquette 2005j).

Several transportation and utility corridors exist in the project area. The main roads associated with the proposed project include I-95, Route 6, and Stud Mill Road. Stud Mill Road is a private haul road owned by International Paper. This logging road connects the Penobscot and the St. Croix River valleys and provides access to many recreational opportunities. Utility corridors include the existing MEPCO 345-kV transmission line from the Orrington Substation to Orient, Maine; other smaller lines in the western portion of the project area; the EMEC transmission line in the eastern portion of the MEPCO South Route area that serves the area in Maine between Houlton and the southeastern tip of Maine (Figure 1.1-1); and the M&N gas pipeline that closely parallels Stud Mill Road.

3.3.4 Recreation and Tourism

The tourism and recreation industry follows directly behind the forestry industry in economic importance in Maine. Recreational opportunities include outdoor activities, such as sightseeing, hunting and fishing, hiking, camping, wildlife viewing, canoeing and kayaking, and motorized recreation use (such as ATV and snowmobile use). Recreation in the State of Maine typically occurs on private lands because public lands represent a small fraction of land available for recreation. Private forest owners generally allow recreational use of their lands, except where such use would conflict with current cutting operations.

Federal lands near the alternative routes include Moosehorn National Wildlife Refuge in Washington County and Sunkhaze Meadows National Wildlife Refuge near Milford (Figure 2.1-1). Public lands within the three-county area mostly include lands owned and managed by the Maine Department of Conservation (MDOC), Bureau of Parks and Lands, such as Cobscook Bay State Park in Washington County and Duck Lake Unit in Hancock County. The Nature Conservancy manages Marble Fen and Sebois River Gorge in Penobscot County, both of which are public lands, for the State. The MDOC also has conservation easements along the Machias River. The Machias River Project was a Nature Conservancy initiative to establish conservation protection for the Machias River shoreline. In 2003, a transaction involving the State of Maine, The Nature Conservancy, and International Paper was completed, creating a conservation corridor along the Machias River consisting of conservation easement and fee ownership. In the vicinity of Stud Mill Road, this conservation corridor was conveyed to the State of Maine as fee land (i.e., the State became the owner of the property). This corridor is approximately 2,500 ft (762 m) wide and extends north of Stud Mill Road. The number of acres of public lands crossed by the alternative routes would be as follows: Modified Consolidated Corridors Route — 85 acres (34 ha); Consolidated Corridors Route — 28 acres (11 ha); Previously Permitted Route — 82 acres (33 ha); and MEPCO South Route — 57 acres (23 ha).

Two National Natural landmarks occur in the area of the alternative routes. National Natural Landmarks are natural areas of outstanding biological and geologic features, may be publicly or privately owned, and are designated by the Secretary of the Interior with concurrence of the owner. The Passadumkeag Marsh and Boglands National Nature Landmark is located in Penobscot County, and Meddybemps Heath National Landmark is located in Washington County (NPS 2004a,b). Neither of these landmarks, which are both privately owned, would be crossed by the alternative routes.

Water bodies represent an important aspect of recreational opportunities in the State. All ponds and lakes larger than 10 acres (4 ha) are owned by the State (although not included in the statistics of State ownership) and are allowed to be used by the public. The number of lakes within 1 mi (1.6 km) of the alternative routes ranges from 11 for the MEPCO South Route, to 22 for the Previously Permitted Route, 24 for the Modified Consolidated Corridors Route, and 25 for the Consolidated Corridors Route (BHE 2004; Paquette 2005j).

Recreational facilities available in Maine include a variety of camps (campgrounds, primitive campsites, and sporting camps), boat launches, rafting bases, and ski resorts. The Pickerel Pond Youth Conservation Center is located off Stud Mill Road near Sunkhaze Meadows

National Wildlife Refuge. It is a youth camp that promotes fishing, hunting, and conservation (Sloan 2005a). Myra Camps, privately owned hunting camps, are located to the east of Pickerel Pond, also off Stud Mill Road. The number of camps present in the immediate vicinity of the alternative route is included in Table 3.3-3.

Motorized recreational opportunities include power boats for the larger water bodies, snowmobile use during the winter months, and ATV use. Both snowmobiles and ATVs use established ATV trails and other corridors (e.g., utility corridor ROWS, utility access roads, and timber haul roads).

3.4 HYDROLOGICAL RESOURCES

Hydrological resources could be affected if support structures and other facilities would be located within or adjacent to water bodies, or if these facilities affect surface water runoff patterns, surface soil erosion, or groundwater recharge and discharge.

3.4.1 Surface Water

The project area has extensive surface water resources. Surface stream drainage is poorly developed on the glaciated landscape, and there are many ponds and lakes in glacial kettles. Most major rivers in the project area flow southward to the Gulf of Maine.

Three of the alternative routes (Modified Consolidated Corridors, Consolidated Corridors, and Previously Permitted Routes) cross the North Coastal rivershed, which includes the East Machias River, the Machias River, the Narraguagus River, and the Union River subbasins; the Penobscot rivershed; and the St. Croix rivershed. The MEPCO South Route only crosses the Penobscot and St. Croix riversheds. The number of major stream and river crossings for each alternative route would be as follows: Modified Consolidated Corridors Route — 67; Consolidated Corridors and MEPCO South Routes — 66; and Previously Permitted Route — 65. The streams and rivers that would be crossed by the alternative routes are listed in Tables C-1 and C-2 (Appendix C). Appendix B contains detailed route maps that show the streams and rivers crossed by the alternative routes. Section 3.4.5 and Appendix G provide additional discussion of project-area streams that may be utilized by Atlantic salmon.

The lowest stream flows in the project area occur in winter, and the highest occur in spring. Dry conditions were widespread in Maine during 1999 to 2002, with a severe drought in 2001 to 2002. These dry conditions were reflected in low stream-flow levels and groundwater levels (USGS 2004).

The Water Quality Control Board of the MDEP has classified the rivers and streams of Maine into four categories according to water quality. Class AA is the highest quality classification, followed by Classes A, B, and C. The classifications of the water bodies that would be crossed by the alternative routes are listed in Tables C-1 and C-2 (Appendix C), and the classification system is described in more detail in Table C-3 (Appendix C). The number of

Class AA water bodies that would be crossed by each alternative route would be 13 for the Modified Consolidated Corridors Route, 10 for the Consolidated Corridors Route, 18 for the Previously Permitted Route, and 5 for the MEPCO South Route. Some of these include multiple crossings of the same water body (Table C-1, Appendix C).

The Natural Resources Protection Act (NRPA) also has classified some of Maine's rivers and streams into Classes A, B, C, and D in terms of unique natural and recreational characteristics and on the basis of resource values of geologic/hydrologic features, critical ecological resources, scenery, history, degree of river development, fisheries, and recreational boating, with Class A being the highest rating. The classified water bodies crossed by the alternative routes are listed in Tables C-1 and C-2 (Appendix C), and the NRPA classification system is described in more detail in Table C-4 (Appendix C) (MDOC and NPS 1982). The only Class A streams crossed by the alternative routes are the St. Croix River (all four routes) and the Narraguagus and Machias Rivers (all routes except the MEPCO South Route).

The Maine Legislature declared that certain rivers, because of their unparalleled natural and recreational values, provide irreplaceable social and economic benefits to the people in their existing state. These rivers are designated as Outstanding River Segments. Outstanding River Segments that would be crossed by all alternatives except the MEPCO South Route are the Narraguagus and Machias Rivers. The Allagash River is the only designated Wild and Scenic River in Maine; however, none of the alternative routes would cross the Allagash River or any of its tributaries.

The Grand Falls Flowage would be the only "lake" crossed by any of the alternative routes (MEPCO South Route east of Princeton, Figure 2.1-3). It is actually a reservoir system that was created by damming a portion of the St. Croix River. Between 12 and 25 lakes and large ponds are located within 1 mi (1.6 km) of the alternative routes and thus could be affected by siting and construction of support structures and other facilities. These ponds and lakes are listed in Table C-5 (Appendix C).

Floodplains are associated with the numerous streams within the Penobscot, Union, Narraguagus, Machias, East Machias, and St. Croix River watersheds that would be crossed by the alternative routes. The wetland and floodplain assessment (Appendix E) provides more detailed information on the floodplains within the project area.

3.4.2 Groundwater

Groundwater occurs in the bedrock and within glacial till, glaciofluvial deposits, and glaciomarine deposits. The glaciofluvial deposits are composed primarily of sand and gravel and are the major source of groundwater in Hancock, Penobscot, and Washington Counties. High-yield aquifers are commonly located in the vicinity of rivers, streams, and other surface water bodies.

The water table in the project area is shallow, ranging from a few feet to 20 ft (6.1 m) below land surface, and fluctuates from low in summer to high in late fall. The bedrock aquifer is

composed of fractured igneous and metamorphic rock. Well depths may range from 20 to 800 ft (6 to 244 m) (FERC 1998). Domestic wells are normally shallow (5 to 25 ft [1.5 to 7.6 m] deep). Higher-yielding overburden wells (e.g., those used by municipalities) are generally 30 to 150 ft (9 to 46 m) deep (FERC 1998).

Only limited groundwater quality data are available for the State of Maine. Well water within the project area is generally of good quality because it is buffered from pollution by vegetative cover and a general lack of development.

The towns and unincorporated areas traversed by the alternative routes are sparsely populated except for residential areas near the existing MEPCO 345-kV line. Therefore, the use of groundwater resources for drinking water or industrial uses is limited. No wells are located close to the ROWs for any of the alternative routes.

3.5 ECOLOGICAL RESOURCES

This section describes the ecological resources within the project area that could be affected by construction, operation, and maintenance of the NRI.

Ecological Resources

Ecological resources include plant and animal species and the habitats on which they depend (e.g., forests, fields, wetlands, streams, and lakes).

3.5.1 Terrestrial

3.5.1.1 Vegetation

The vegetation of the project area (Hancock, Penobscot, and Washington Counties) is largely eastern boreal and temperate deciduous forest. Spruce-fir is the most prevalent forest type, consisting of a mixture of softwoods and hardwoods (LURC 1997). Table 3.5-1 lists the major tree species. Maine's forests have a low diversity of shrub species (McWilliams et al. 2005). The amount of forest and nonforest lands within the three counties is listed in Table 3.5-2.

Terrestrial vegetation may be affected by a variety of factors associated with the construction and maintenance of the ROW and associated infrastructure. Effects may include injury or loss of individual plants and habitat disturbance.

General vegetative cover types that occur in the project area include early successional and clear-cut areas, spruce-fir forests, white pine-mixed hardwood forests, forested wetlands, scrub-shrub wetlands, and emergent wetlands (TRC 2002). Wetlands are addressed in Section 3.5.3 and in the wetland and floodplain assessment (Appendix E). Early successional habitats (whose vegetation is dominated by grasses and forbs) are found throughout the project area and include fallow fields, hayfields and other agricultural lands, and existing ROWs

TABLE 3.5-1 Major Tree Species That Occur within the Area of the Alternative Routes

Softwoods	Hardwoods
Balsam fir (*Abies balsamea*)	American beech (*Fagus grandifolia*)
Black spruce (*Picea mariana*)	Black cherry (*Prunus serotina*)
Eastern hemlock (*Tsuga canadensis*)	Gray birch (*Betula populifolia*)
Eastern larch (*Larix laricina*)	Northern red oak (*Quercus rubrum*)
Northern white cedar (*Thuja occidentalis*)	Paper birch (*Betula papyrifera*)
Red pine (*Pinus resinosa*)	Pin cherry (*Prunus pensylvanica*)
Red spruce (*Picea rubens*)	Poplar, bigtooth aspen (*Populus grandidentata*)
White pine (*Pinus strobus*)	Poplar, quaking (*Populus tremuloides*)
White spruce (*Picea glauca*)	Red maple (*Acer rubra*)
	Sugar maple (*Acer saccharum*)
	White ash (*Fraxinus americana*)
	Yellow birch (*Betula alleghaniensis*)

Source: University of Maine (1997).

TABLE 3.5-2 Forest and Nonforest Land in Hancock, Penobscot, and Washington Counties, 2003

	Land Area (acres)[a]		
County	Forest Land (Timberland)	Nonforest Land	Total
Hancock	916,800 (855,500)	99,400	1,016,200
Penobscot	2,001,200 (1,958,700)	172,100	2,137,300
Washington	1,529,500 (1,481,300)	114,300	1,643,800

[a] To convert acres to hectares, multiply by 0.405.

Source: McWilliams et al. (2005).

(e.g., for transmission lines and gas pipelines). These areas are frequently disturbed by tilling, harvesting, and/or vegetation maintenance practices.

As discussed in Section 3.3.1, about 92% of the three-county project area is forested, and 97% of this is classified as timberland, which is forest land capable of producing crops of wood and not restricted from harvest. The alternative routes cross mostly privately owned and managed timberlands consisting of a patchwork mosaic of recent clear-cuts, young second- and third-growth stands, and older managed stands of different forest types (Table 3.5-3). Consequently, ongoing forestry practices have affected, and will continue to affect, the character of this landscape. Table 3.5-4 lists the acreage of forest land (including managed and unmanaged forests) by stand-size class (i.e., a group of forest trees of sufficiently uniform species

TABLE 3.5-3 Timberland Acres by Forest-Type Group in Hancock, Penobscot, and Washington Counties, 2003[a]

Forest-Type Group	Hancock County	Penobscot County	Washington County
White-red pine	79,400	239,000	169,400
Spruce-fir	361,900	642,400	628,800
Exotic softwoods[b]	0	6,200	0
Oak-pine	3,900	24,800	16,900
Oak-hickory	30,000	17,800	0
Elm-ash-red maple	11,400	77,100	23,900
Northern hardwoods[c]	260,700	708,700	372,300
Aspen-beech	108,300	254,600	256,400
Nonstocked[d]	0	0	13,600
Total	855,500	1,958,700	1,481,300

a To convert acres to hectares, multiply by 0.405.

b Non-native coniferous species, such as loblolly pine, yellow pine, and Douglas fir.

c Northern hardwoods are dominated by sugar maple, beech, and birch.

d Nonstocked = forest land that is <10% stocked with live trees.

Source: McWilliams et al. (2005).

TABLE 3.5-4 Acres of Forest Land by Stand-Size Class in Hancock, Penobscot, and Washington Counties, 2003[a]

Stand-Size Class[b]	Hancock County	Penobscot County	Washington County
Sawtimber	264,100	515,100	341,700
Poletimber	392,900	817,600	535,900
Sapling and Seedling	259,800	668,500	638,300
Nonstocked[c]	0	0	13,600
Total	916,800	2,001,200	1,529,500

a To convert acres to hectares, multiply by 0.405.

b See the Glossary (Chapter 13) for definitions of each of the stand-size classes.

c Nonstocked = forest land that is <10% stocked with live trees.

Source: McWilliams et al. (2005).

composition, age, and condition to be considered a homogeneous unit for management purposes) in the three counties. The amount of forest land within the proposed ROWs ranges from about 87% for the MEPCO South Route to 91.5% for the Consolidated Corridors Route. This is within the State forest land average of 90%.

The Maine Natural Areas Program (MNAP), within the MDOC, maps the locations of rare, threatened, and endangered plants and rare and exemplary natural communities in Maine. Significant wildlife habitats have also been identified under the NRPA administered by the MDEP. The significant wildlife habitats that occur within 1.0 mi (1.6 km) to either side of the alternative routes[5] include (1) habitats for Federally listed or State listed threatened and endangered species; (2) high- and moderate-value deer wintering areas and travel routes; and (3) high- and moderate-value waterfowl (ducks, geese, and mergansers) and wading birds (bitterns, herons, egrets, ibis, rails, coots, and moorhen) habitats, including nesting and feeding areas. The rare or exemplary botanical features and significant wildlife habitats located within or adjacent to the alternative routes are shown on the detailed route maps in Appendix B and tabulated in Table 3.5-5. The Modified Consolidated Corridors and Consolidated Corridors Routes would cross a domed bog ecosystem just southwest of Sunkhaze Stream (Figure B.1-1e, Appendix B). The Modified Consolidated Corridors, Consolidated Corridors, and Previously Permitted Routes would cross the kettle hole bog-pond ecosystem near Sunkhaze Stream and a low sedge-buckbean fen lawn and raised level bog ecosystem at Sawtelle Heath east of State Route 1 (Figure B.1-1m, Appendix B).

Mapped special status plant species are addressed in Section 3.5.4.

TABLE 3.5-5 Significant Habitats within the ROWs for the Alternative Routes

	Alternative Route[b]			
Habitat[a]	MCCR	CCR	PPR	MSR
Rare natural communities (acres)	7.4	3.4	7.9	0.0
Deer yards (number)	2	1	2	1
Deer yards (acres)	7.3	5.8	6.5	7.6
Waterfowl and wading bird habitats (acres)	133	113	93	148

[a] To convert acres to hectares, multiply by 0.405.

[b] CCR = Consolidated Corridors Route, MCCR = Modified Consolidated Corridors Route, MSR = MEPCO South Route, PPR = Previously Permitted Route.

Sources: BHE (2004); Paquette (2005j).

5 These dimensions have their origins in the practice of siting transmission lines, whereby a 2.0-mi (3.2-km)-wide corridor of uncertainty is typically selected for the working corridor width wherein a final transmission line route can be situated without the need for further regulatory review.

3.5.1.2 Wildlife

A high diversity of wildlife species occurs in the project area because of the variety of habitat types present. However, wildlife diversity has decreased in areas where even-age softwood stands have been developed for the logging industry (Ota and Restino 2001). The MDIFW actively manages numerous game species. These include black bear (*Ursus americanus*), moose (*Alces alces*), white-tailed deer (*Odocoileus virginianus*), furbearers, upland gamebirds, and waterfowl (MDIFW 2004). Wildlife could be disturbed during construction and may also be affected by the presence and maintenance of the NRI.

Wildlife may be affected as a result of habitat loss or fragmentation, disturbance by construction activities and noise, and injury by interactions with construction vehicles. In addition, birds may be affected by collisions with the NRI.

3.5.1.2.1 Mammals. Table D-1 (Appendix D) lists the mammal species that could occur within the project area. The relative abundance and habitat preference for each species are also provided. One of the significant wildlife habitats within the project area is wintering areas for white-tailed deer known as deer yards. Deer conserve energy during winter by moving into these traditional wintering areas. The softwood canopy cover in deer yards maintains warmer than average temperatures and greatly reduces wind speed. The softwood cover also intercepts much of the snowfall. The remaining ground accumulations of snow become firmly packed, which makes traveling much easier for deer and decreases their energy demands. Deer yards that occur along each of the alternative routes are shown on the detailed route maps in Appendix B. No more than two deer yards would occur within any of the alternative routes (Table 3.5-5).

3.5.1.2.2 Birds. More than 330 bird species have been reported from Maine (Mainebirding 2003). Nearly 200 species have been reported on or near the Sunkhaze Meadows National Wildlife Refuge (USFWS 2000) (Figure 2.1-2), while 220 species have been reported from the Moosehorn National Wildlife Refuge (USFWS 1994) (Figure 2.1-1). Table D-2 (Appendix D) lists the bird species that could occur within the project area. The relative abundance, habitat preference, and seasonal residency for each species are also provided. The diversity of species in the project area is probably a reflection of the habitat mosaic that exists because of timber and other management activities.

Waterfowl (e.g., ducks, geese, and swans) habitats and wading bird (e.g., bitterns, herons, egrets, rails, and coots) habitats are considered significant wildlife habitats in Maine. Mapped waterfowl and wading bird habitats that occur along each of the alternative routes are shown on the detailed route maps in Appendix B. Waterfowl and wading bird habitats that occur within the ROWs for each alternative route range from 93 to 148 acres (38 to 60 ha) (Table 3.5-5).

3.5.1.2.3 Amphibians and Reptiles. Table D-3 (Appendix D) lists the amphibian and reptile species that range within the project area. The relative abundance and habitat preference for each species are also provided. No significant wildlife habitats are identified for these species in the project area.

3.5.2 Aquatic

Aquatic biota may be affected by habitat alteration or disturbance, sedimentation, stream warming, and exposure to herbicides during maintenance activities.

Representative warmwater, coldwater, and migratory fish species that occur in the project area are presented in Table 3.5-6. About one-third of Maine's existing resident fish species were introduced, and many of the species present in the project area were introduced as a result of legal sport and forage fish introductions and illegal sport and bait fish introductions. These include the rainbow trout (*Onchorhynchus mykiss*), brown trout (*Salmo trutta*), smallmouth bass (*Micropterus dolomieu*), and largemouth bass (*M. salmoides*) (Halliwell 2003).

TABLE 3.5-6 Representative Fish Species That Could Occur in the Project Area

Warmwater Species	Coldwater and Migratory Species
Chain pickerel (*Esox niger*)	American eel (*Anguilla rostrata*)[a]
Muskellunge (*Esox masquinongy*)	Alewife (*Alosa pseudoharengus*)[a]
Northern pike (*Esox lucius*)	American shad (*Alosa sapidissima*)[a]
Golden shiner (*Notemigonus crysoleucas*)	Blueback herring (*Alosa aestivalis*)[a]
Common shiner (*Luxilus cornutus*)	Brook trout (*Salvelinus fontinalis*)
Creek chub (*Semotilus atromaculatus*)	Brown trout (*Salmo trutta*)
Brown bullhead (*Ameiurus nebulosus*)	Lake trout (*Salvelinus namaycush*)
Banded killifish (*Fundulus diaphanus*)	Atlantic salmon (*Salmo salar*)[a]
Threespine stickleback (*Gasterosteus aculeatus*)	Landlocked salmon (*Salmo salar*)
Ninespine stickleback (*Pungitius pungitius*)	Lake whitefish (*Coregonus clupeaformis*)
White perch (*Morone americana*)	Round whitefish (*Prosopium cylindraceum*)
Largemouth bass (*Micropterus salmoides*)	Burbot (*Lota lota*)
Smallmouth bass (*Micropterus dolomieu*)	Blacknose dace (*Rhinichthys atratulus*)
Black crappie (*Pomoxis nigromaculatus*)	Longnose dace (*Rhinichthys cataractae*)
Redbreast sunfish (*Lepomis auritus*)	Longnose sucker (*Catostomus catostomus*)
Pumpkinseed (*Lepomis gibbosus*)	White sucker (*Catostomus commersoni*)
Yellow perch (*Perca flavescens*)	

[a] Migratory species.

Source: TRC (2002).

The brook trout (*Salvelinus fontinalis*) is the principal coldwater game fish in the project area, occurring in many of the streams crossed by the alternative routes. The project area also contains brown trout streams. Most brown trout stream habitat is shared with brook trout, but brown trout are also found in some streams too warm for brook trout. The principal warmwater game fish in the NRI project area include smallmouth and largemouth bass, yellow perch (*Perca flavescens*), brown bullhead (*Ameiurus nebulosus*), white perch (*Morone americana*), burbot (*Lota lota*), and chain pickerel (*Esox niger*).

The larger rivers and several of their tributaries in the project area are capable of supporting several migratory fish species. The American eel (*Anguilla rostrata*) is a catadromous fish species (species that return to the sea for spawning) that occurs in the project area. Anadromous fish species (species that return from the sea to freshwater streams and rivers for spawning) include the Atlantic salmon (*Salmo salar*), blueback herring (*Alosa aestivalis*), alewife (*A. pseudoharengus*), and American shad (*A. sapidissima*). The alewife is the most numerous of the anadromous fish migrating up Maine's coastal streams and rivers (including the St. Croix River) and is an important food resource for the bald eagle (*Haliaeetus leucocephalus*). Wild populations of Atlantic salmon, Federally listed as endangered, were found in all of the watersheds crossed by the proposed project before the installation of dams on the St. Croix, Machias, Narraguagus, and Penobscot Rivers. Although this species currently does not spawn in the immediate vicinity of the alternative routes, potential spawning habitat still occurs in many of the streams crossed by the alternative routes. More detailed information on the Atlantic salmon is presented in Section 3.5.4 and in the EFH assessment (Appendix G).

3.5.3 Wetlands

Wetlands within the project area are primarily palustrine emergent, open water, scrub-shrub, and forested. These wetlands include inland marshes, wet meadows, peatlands, shrub swamps, forested swamps (both deciduous and evergreen), forested floodplain wetlands, and vernal pools (MDEP 2005). Riverine wetlands are common within the channels of water bodies. The wetlands that would be crossed by the alternative routes include wetlands of special significance. These include wetlands that contain a critically imperiled or imperiled natural community, provide significant wildlife habitat, are located near Great Ponds, or are subject to flooding.

Wetlands

The USFWS defines wetlands as areas that are transitional between terrestrial and aquatic systems and have a water table usually at or near the substrate surface or a substrate that is covered by shallow water (Cowardin et al. 1979). The U.S. Army Corps of Engineers (USACE 1987) defines wetlands as areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soils conditions. Wetlands generally include swamps, marshes, bogs, fens, and similar areas.

Table 3.5-7 provides an overview of the wetland resources that occur within each alternative route. More detailed information on the wetlands is provided in the wetland and

TABLE 3.5-7 Overview of Wetland Resources within the ROWs for the Alternative Routes

	Alternative Route[a]			
Wetland Parameter	MCCR	CCR	PPR	MSR
Number of wetlands crossed	188	184	193	319
Length of route crossing wetlands (mi)[b]	7.7	6.6	8.2	11.5
Area of wetlands within ROW (acres)[c]	133	108	152	173
Forested wetlands within ROWs (acres)	70	53	103	73

[a] CCR = Consolidated Corridors Route, MCCR = Modified Consolidated Corridors Route, MSR = MEPCO South Route, PPR = Previously Permitted Route.

[b] To convert miles to kilometers, multiply by 1.609.

[c] To convert acres to hectares, multiply by 0.405.

Sources: BHE (2004); Paquette (2005j)

floodplain assessment (Appendix E), including detailed maps showing the locations of wetlands along the alternative routes.

3.5.4 Special Status Species

Special status plant and wildlife species are subject to regulations under the authority of Federal and State agencies. They include those species that are listed, or are being considered for listing, as threatened or endangered by the USFWS or by NOAA Fisheries (i.e., Federally endangered, threatened, proposed, or candidate species) or that are listed as threatened, endangered, or of special concern by the State of Maine. Regulations pertinent to the NRI include the Endangered Species Act (ESA), Bald and Golden Eagle Protection Act, Migratory Bird Treaty Act, the Magnuson-Stevens Fishery Conservation and Management Act, and the Maine Endangered Species Act.

Table D-4 in Appendix D provides a list of the Federally and State listed special status species that could be present within the project area. It includes information on the distribution and habitat of these species and designates the basis for their listing. No critical habitats for the Federally listed species occur within the project area. The list of species identified in Table D-4 was developed from various sources, including consultation with the USFWS and NOAA Fisheries and through Web sites maintained by the MDIFW and the MNAP. No Federally listed plant species occur in the project area, although more than 30 State listed plant species could be present in the project area. Four State listed aquatic invertebrates also occur in the project area. The Federally endangered Atlantic salmon occurs within the watersheds crossed by the Modified Consolidated Corridors, Consolidated Corridors, and Previously Permitted Routes, while the Federally endangered shortnose sturgeon (*Acipenser brevirostrum*) occurs in the Penobscot River, which would be crossed twice by the MEPCO South Route. Several State listed bird

species and the Federally threatened bald eagle occur in the project area. The range for two Federally endangered mammal species (Eastern timber wolf [*Canis lupus lycaon*] and Eastern cougar [*Felis concolor couguar*]) includes the project area, but the potential for their occurrence is remote (Table D-4, Appendix D).

Additional information on the Atlantic salmon and bald eagle, identified by the USFWS and/or NOAA Fisheries as species that might be affected by the project, are presented below and in the biological assessment (Appendix F) and EFH assessment (Appendix G). Appendix A contains copies of consultation letters received from the USFWS and NOAA Fisheries.

Terms Applicable to Special Status Species

Endangered species: Any Federal species listed by the USFWS or NOAA Fisheries that is in danger of extinction throughout all or a significant portion of its range, or any State species listed by the MDIFW or MNAP that is in danger of extirpation within Maine.

Threatened species: Any Federal species listed by the USFWS or NOAA Fisheries or State species listed by the MDIFW or the MNAP that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range or the State of Maine, respectively.

Candidate species: A species for which the USFWS or NOAA Fisheries currently has substantial information on hand to support the biological appropriateness of proposing to list the species as endangered or threatened.

Critical habitat: Specific Federally designated area on which is found those physical and biological features essential to the conservation of a listed species.

Species of special concern: Any species or subspecies native to Maine that has entered a long-term decline in abundance or is vulnerable to a significant decline because of low numbers, restricted distribution, dependence on limited habitat resources, or sensitivity to environmental disturbance.

3.5.4.1 Atlantic Salmon (*Salmo salar*)

The Gulf of Maine distinct population segment (DPS) for the Atlantic salmon has no State listing but is Federally listed as endangered. Watersheds that could be used by this population segment include the Sheepscot, Ducktrap, Narraguagus, Pleasant, Machias, East Machias, and Dennys Rivers. Atlantic salmon populations in the Kennebec River and its tributaries and the main stem of the Penobscot River are not part of the Gulf of Maine DPS because native populations were thought to be extirpated in the Kennebec River, and the Penobscot River has received substantial supplemental stocking of Atlantic salmon from Canadian rivers.

The Atlantic salmon spawns in late fall, with eggs hatching in early spring. Young Atlantic salmon spend 1 to 3 years in their stream rearing habitat, go to sea in spring (they may migrate as far as Greenland), and return to spawn after one to four winters at sea. Adults may spawn in more than 1 year, although severe post-spawning mortality is normal. Freshwater habitats for the Atlantic salmon are rocky runs and pools of small to large rivers. Eggs are laid in gravel-bottomed riffles in a nest (redd) and covered with gravel. Normal egg development requires water temperatures less than 50ºF (less than 10ºC), with an optimum temperature of 43ºF (6ºC). Rearing habitat includes shallow riffle areas interrupted by pools and deeper riffles. Parr (young freshwater salmon with distinctive vertical bars) require cover such as large rocks.

Adults eat fishes and crustaceans when at sea, but do not feed in freshwater. Young consume primarily invertebrates.

The Atlantic salmon was nearly extirpated from New England in the 1800s because of habitat loss and degradation from dam construction and logging. The endangered status for the DPS relates to its small spawning range in the rivers, low abundance of spawning individuals, poor marine survival, habitat degradation (e.g., sedimentation and water withdrawals), diseases, and genetic impacts on salmon from aquaculture facilities. The Gulf of Maine DPS is declining steadily. The number of smolts (juvenile salmon that are migrating to the sea) leaving rivers is not increasing at the same rate as parr abundance is increasing (the parr increase is due to stocking hatchery-raised fry in the habitats). The estimated total returns (i.e., adults returning from the sea for spawning) in 2002 were estimated at <50 fish for the entire Gulf of Maine DPS.

The Modified Consolidated Corridors, Consolidated Corridors, and Previously Permitted Routes cross the Narraguagus River, Machias River, and the East Machias River watersheds. Within these watersheds, the following streams are considered Atlantic salmon streams of special concern: Narraguagus River, two tributaries to Fifth Machias Lake, a tributary to Fletcher Brook, Machias River, a tributary to Dead Stream, Lanpher Brook, Huntley Brook, and Joe Brook (Bartlett 2004; BHE 2005). No Atlantic salmon streams of special concern would be crossed by the MEPCO South Route. Table 3.5-8 provides an overview of the Atlantic salmon streams crossed by the alternative routes. More detailed information on the Atlantic salmon is presented in the biological assessment (Appendix F) and EFH assessment (Appendix G).

3.5.4.2 Bald Eagle (*Haliaeetus leucocephalus*)

The bald eagle is both Federally listed and State listed as threatened (it was proposed for Federal delisting in 1999). This species occurs throughout Maine, inhabiting shore lands and uplands adjacent to coastal waters, lakes, and large rivers. The bald eagle is a year-round resident

TABLE 3.5-8 Overview of Atlantic Salmon Streams Crossed by the Alternative Routes

	Number per Alternative Route[a]			
Parameter	MCCR	CCR	PPR	MSR
Distinct population segment water bodies	31	32	27	0
Essential fish habitat water bodies	67	66	65	66
Atlantic salmon streams of special concern	9	9	9	0
Atlantic salmon spawning and rearing areas	0	0	0	0

[a] CCR = Consolidated Corridors Route, MCCR = Modified Consolidated Corridors Route, MSR = MEPCO South Route, PPR = Previously Permitted Route.

Sources: BHE (2004); Bartlett (2004); Paquette (2005j).

of Maine, occurring as part of a resident population and as a migrant from elsewhere. It commonly roosts communally, especially in winter. Breeding habitat mostly includes areas close to (i.e., within 3 mi [5 km]) coastal areas, bays, rivers, lakes, or other bodies of water that reflect the availability of primary food sources such as fish, waterfowl, and seabirds. In winter, bald eagles may occur in areas where waterfowl concentrate, or they may congregate in areas with abundant dead fish. They may also occur in areas without open water if other food sources (e.g., rabbit or deer carrion) are readily available. Low rates of reproduction have been the major obstacle to the bald eagle's recovery in Maine (MDIFW 2003). Habitat loss and disturbance at nest sites, environmental contamination, and human-caused deaths and injuries are the primary threats to the bald eagle. Nevertheless, Maine's bald eagle population continues to expand, and each spring new nest locations are usually found (Bartlett 2004).

Essential Habitat

Because of a 1988 amendment to the Maine Endangered Species Act, the MDIFW may designate areas as "Essential Habitat" for species listed as endangered or threatened, and develop guidelines for these essential habitats (MDIFW 2004).

Essential habitats are defined as areas currently or historically providing physical or biological features essential to the conservation of an endangered or threatened species in Maine, and which may require special management considerations. Essential habitat has only been designated for bald eagle nest sites, roseate tern nesting areas, and feeding and brood-rearing areas for the least tern and piping plover. Only essential habitat for the bald eagle occurs in the project area.

The locations of bald eagle nesting sites near the alternative routes can be found on the detailed maps for the alternative routes presented in Appendix B. One State-designated essential habitat for the bald eagle would be crossed by the MEPCO South Route (Figure B.4-1, Appendix B), while none would be crossed by the other alternative routes. The number of bald eagle essential habitats less than 1 mi (1.6 km) from the alternative routes are six each for the Modified Consolidated Corridors, Consolidated Corridors, and Previously Permitted Routes. These occur near the Penobscot River (Figure B.1-1b), Alligator Lake (Figure B.1-1g), and Pocomoonshine Lake (Figure B.1-1m). Eleven essential bald eagle habitats occur within 1 mi (1.6 km) from the MEPCO South Route. Most of these occur near the Penobscot River (Figures B.4-1b, B.4-1d, B.4-1k, B.4-1l, B.4-1m, and B.4-1n), with two at Grand Falls Flowage and one along the St. Croix River (Figure B.4-1x). Further information on the bald eagle is presented in the biological assessment (Appendix F).

3.6 CULTURAL RESOURCES

This section discusses cultural resources in the vicinity of the four alternative routes. Cultural resources include archaeological sites and historic structures and features that are protected under the National Historic Preservation Act of 1966 (NHPA) as amended (16 USC § 470) and its implementing regulations (36 CFR Part 800). Cultural resources also include traditional cultural properties that are important to a community's practices and beliefs and are necessary for maintaining a community's cultural identity. Cultural resources that meet the eligibility criteria for listing on the *National Register of Historic Places* (NRHP) are considered "significant" historic properties and must be taken into consideration during the

planning of Federal projects. Federal agencies are required to consider the effects of their actions on sites, areas, and other resources (e.g., plants) that are of religious significance to Native Americans, as established under the American Indian Religious Freedom Act (Public Law [P.L.] 95-341). Native American graves and burial grounds, including human remains, sacred and funerary objects, and objects of cultural patrimony, are protected by the Native American Graves Protection and Repatriation Act (P.L. 101-601).

The archaeological record of Maine dates back to approximately 11,500 years ago and is typically described using the following cultural periods: Paleoindian (ca. 11,500 to 9,500 radiocarbon years before present (BP),[6] Archaic (ca. 9,500 to 3,000 BP), Ceramic (3,000 to 450 BP), and Historic or Contact (450 BP to present).[7] The Paleoindian Period is the period least represented in the archaeological record and consequently the least understood. People living during this period were hunters and gatherers who were highly mobile, likely moving with the herds of caribou and other big game species they hunted. Archaeological evidence consists mostly of isolated spear points diagnostic of the period and short-term campsites. The Archaic Period is characterized by a shift in hunting strategies from larger to smaller game and fish. Artifacts include chipped stone tools, groundstone tools, and evidence of mortuary practices, such as the presence of grave goods and red ochre sprinkled over the tops of grave sites. The Ceramic Period is characterized by the first evidence of pottery, although hunting and gathering remained the predominant lifestyle. Many of these sites are either coastal shell middens or adjacent to water bodies in the interior. It is not until the end of this period that evidence of horticulture emerges for the area, mostly, however, for the southern part of Maine (Clark et al. 2004). Finally, the Historic Period begins with European contact and written historical accounts to accompany the archaeological record.

Clark et al. (2004) provide a summary of archaeological investigations conducted in the vicinity of the alternative routes in southeastern Maine. Although little is known archaeologically in this predominantly undeveloped part of Maine, a fair amount of research has been conducted over the last 100 years along the Penobscot River drainage, which is an area of high potential for archaeological remains.

The most important surveys for assessing the impact of the NRI on cultural resources are those conducted for the Previously Permitted Route (Cox 1989), the M&N gas pipeline from Milford to Baileyville (TRC 2002), and the Modified Consolidated Corridor Route (Clark et al. 2004). Each of these surveys included portions of the alternative routes in the Stud Mill Road area, and each survey concluded that the area has a relatively low potential for containing significant archaeological sites. Cox (1989) recorded three small prehistoric sites, one of which was considered potentially significant. Five locations containing historic material and one prehistoric site were recorded during the pipeline survey (TRC 2002). No prehistoric sites and one potentially significant historic property were recorded during the latest survey for the

6 "Before present" (BP) is a year numbering system used for past times that relates dates to the year 1950. For example, 12,000 BP means 12,000 years before 1950.

7 The NRHP typically applies to significant sites, structures, and objects more than 50 years in age; however, there are exceptions for those sites, structures, and objects of exceptional significance.

Modified Consolidated Corridor Route (Clark et al. 2004). No specific archaeological survey information regarding the MEPCO South Route is available, although a portion of this route closely parallels the Penobscot River and would cross it at two locations. This area has been identified by the Penobscot Nation as an area of concern regarding archaeological sites during route location meetings (Dana 2003).

In addition to information obtained through past archaeological surveys and the resulting recorded sites, the history of past ground disturbance also plays a role in determining the potential impact on significant cultural resources. The amount and type of previous disturbance varies by route and includes ROW clearing (for existing electricity transmission and gas pipeline corridors), recreational use (campsites and ATV trails), existing roads (temporary or permanent), timber harvesting areas, and historical use areas (such as mills or airports, including those proposed for staging areas as described in Section 2.3.4). Previously disturbed areas are not likely to contain intact archaeological deposits and, therefore, if any archaeological sites happen to be present within these areas, they are less likely to be considered significant. Wetland areas along the alternative routes may, depending on their age and origin (beaver activity and construction runoff), contain archaeological deposits that have not been surveyed because of difficulty in accessing the site.

The NRHP lists 299 properties within Hancock, Penobscot, and Washington Counties. None of these properties is located within the ROW for any of the alternative routes. One property is within 1 mi (1.6 km) of the MEPCO South Route.

DOE has consulted with Native American Tribes to obtain information about traditional cultural properties in the area, as well as other concerns that Native American groups might have regarding the effect of the project on cultural resources. Appendix A contains letters initiating formal consultation with the Aroostook Band of Micmacs, the Houlton Band of Maliseet Indians, the Passamaquoddy Tribe, the Penobscot Indian Nation, and the Pleasant Point Passamaquoddy Reservation. In addition, members of the Penobscot Indian Nation, the Houlton Band of Maliseets, and the Passamaquoddy Tribe have been present at BHE meetings on the siting alternatives. No specific traditional cultural properties have been identified along the alternative routes during government-to-government consultations or during the siting meetings. A general concern about impacts on archaeological sites has been expressed by the Penobscot Indian Nation, especially along the Penobscot River drainage, and by the Passamaquoddy Tribe. DOE also wrote to the Eastern Regional Office of the Bureau of Indian Affairs (see Appendix A).

Table 3.6-1 presents an overview of cultural resources within the ROWs for the alternative routes.

3.7 SOCIOECONOMICS

Socioeconomic data for the NRI are presented for a region of influence (ROI) composed of Hancock, Penobscot, and Washington Counties. The ROI captures the area within which NRI construction, operations and maintenance workers for each of the alternative routes would spend

TABLE 3.6-1 Overview of Cultural Resources within the ROWS for the Alternative Routes

Cultural Resources Parameter	Alternative Route[a] MCCR	CCR	PPR	MSR
Number of historic archaeological resources within ROW	0	0	0	1
Number of historic archaeological resources within 1 mi of ROW[b]	8	8	8	10
Number of prehistoric archaeological sites within ROW	4	5	4	12
Number of prehistoric archaeological sites within 1 mi of ROW	30	31	28	46
Number of NRHP sites[c] within ROW	0	0	0	0
Number of NRHP sites within 1 mi of ROW	0	0	0	1
Significant sensitive soils within ROW (acres)[b, d]	87	111	115	21
Significant sensitive soils within 1 mi of ROW (acres)	2,843	3,496	3,334	1,763
Number of locations possessing high and moderate archeological sensitivity along the ROW[e]	51	51	51	59

[a] CCR = Consolidated Corridors Route, MCCR = Modified Consolidated Corridors Route, MSR = MEPCO South Route, PPR = Previously Permitted Route.

[b] To convert miles to kilometers, multiply by 1.609; to convert acres to hectares, multiply by 0.405.

[c] NRHP = *National Register of Historic Places*.

[d] Significant sensitive soils = the types of soils that tend to have higher numbers of prehistoric archaeological sites. These are generally better drained soils that early settlers preferred as campsites. Soil sensitivity refers to soil properties such as permeability.

[e] High and moderate archaeological sensitivity = based on "Phase I" surveys, which include a review of previous studies, proximity to water, topography, aspect, and geographical information system (GIS) data or a combination thereof.

Sources: BHE (2004; Paquette (2005j).

their wages and salaries, and the expected location of many of the vendors that would supply materials, equipment, and services to the proposed project. The ROI is used for the assessment of the impacts of NRI construction and operation of each alternative route on population, employment, income, and housing.

3.7.1 Population

In 2000, the population within the ROI was 230,651. On the basis of the average annual population growth rate of 0.1% over the period 1990 to 2000, population in the ROI is expected to reach 231,800 by 2005 (Table 3.7-1). Population in the ROI grew at a rate slightly lower than the annual rate of 0.4% for the State over the same period. Within the ROI in 2000, 90,864 persons (40% of the ROI population) lived within the Bangor Metropolitan Statistical Area (MSA), which consists of parts of Penobscot and Waldo Counties. Most of the remaining population resided in other incorporated areas, such as Ellsworth (population of 6,456), Lincoln

TABLE 3.7-1 Population within the ROI for the Northeast Reliability Interconnect

Entity	1990	2000	Average Annual Growth Rate (%) 1990 to 2000	2005[a]
Bangor MSA[b]	91,629	90,864	-0.1	90,500
Hancock County	46,948	51,791	1.0	54,400
Penobscot County	146,601	144,919	-0.1	144,100
Washington County	35,308	33,941	-0.4	33,300
ROI	228,857	230,651	0.1	231,800
Maine	1,227,928	1,274,923	0.4	1,299,100

[a] ANL projections.

[b] MSA = metropolitan statistical area, ROI = region of influence (Hancock, Penobscot, and Washington Counties).

Source: U.S. Bureau of the Census (2005a).

(5,221), Bar Harbor (4,820) and Calais (3,447) (U.S. Bureau of the Census 2005a). The average annual population growth rate within the Bangor MSA was −0.1% over the period 1990 to 2000. Annual average growth rates in Penobscot and Washington Counties were slightly negative over the same period, with a small increase in population in Hancock County. Growth rates in many smaller communities in the ROI were negative over this period.

3.7.2 Employment

Employment in the ROI was 90,701 in 2002 and, based on the average annual employment growth rate of 1.5% over the period 1992 to 2002, is expected to reach 92,100 in 2005 (Table 3.7-2). Dominant employment sectors are services (46% of total ROI employment), wholesale and retail trade (21%), manufacturing (11%), and agriculture (10%); these sectors accounted for 87% of the total employment in the ROI (Table 3.7-2).

Lumber production and the operation of timber tracts employed a small number of people in each of the three counties in 2002: approximately 50 each in Hancock and Penobscot Counties and approximately 200 in Washington County (U.S. Bureau of the Census 2005b).

3.7.3 Unemployment

Unemployment in the ROI has steadily declined from a peak rate of 7.8% in 1994 to a December 2004 rate of 5.3% (Table 3.7-3) (U.S. Bureau of Labor Statistics 2005a).

TABLE 3.7-2 Employment by Industry within the ROI for the Northeast Reliability Interconnect, 2002

Sector	Hancock County	Penobscot County	Washington County	ROI Total	Share of ROI Total (%)
Agriculture[a]	1,827	1,809	5,787	9,423	10
Mining	10	0	10	20	<1
Public utilities	60	609	60	729	1
Construction	1,566	2,308	298	4,172	5
Manufacturing	1,963	6,273	1,369	9,605	11
Transportation and warehousing	308	2,277	217	2,802	3
Trade	3,794	13,052	1,758	18,604	21
Finance, insurance and real estate	815	2,578	374	3,767	4
Services	8,529	29,555	3,460	41,544	46
Other	10	15	10	35	<1
Total	18,882	58,476	13,343	90,701	

[a] Includes lumber production employment.

Sources: U.S. Bureau of the Census (2005b); USDA (2005).

TABLE 3.7-3 Unemployment Rates (%) within the ROI for the Northeast Reliability Interconnect

Period	Hancock County	Penobscot County	Washington County	ROI	State
1994 to 2004 (average)	5.5	3.6	9.4	5.1	4.9
2004 (Dec. 2004)	7.4	3.4	7.9	5.3	4.7

Source: U.S. Bureau of Labor Statistics (2005a).

Unemployment in Washington County was particularly high in the 1990s, reaching 12.5% in 1994. December 2004 unemployment rates in Washington County (7.9%) and Hancock County (7.4%) are fairly high compared with the State average (4.7%).

3.7.4 Income

Personal income in the ROI stood at $6.65 billion in 2002, and on the basis of the average annual personal income growth rate of 1.6% over the period 1990 to 2002 in the ROI, is

expected to reach $7.0 billion in 2005 (Table 3.7-4). With income growth exceeding population growth in the 1990s, personal income per capita within the ROI rose over the period, from $23,800 in 1990 to $28,213 in 2002. Within the ROI, $4.16 billion in total annual personal income was produced in Penobscot County in 2002 (63% of the ROI total), with $1.67 billion produced in Hancock County and $0.82 billion in Washington County. Among the three counties, Hancock County had the highest per capita income at $31,541 and Washington County had the lowest at $24,298 in 2002. Personal income growth rates over the period 1990 to 2002 varied from 2.2% in Hancock County to 1.1% in Washington County, although per capita incomes were growing faster in Penobscot County (1.6%) and Washington County (1.5%) than in Hancock County (1.2%).

3.7.5 Housing

Housing within the ROI showed modest growth of 1.0% per year over the period 1990 to 2000 (Table 3.7-5), with more than 11,800 new housing units added during this period. On the basis of the average annual population growth rate of 0.1% over the period 1990 to 2000, 200 new housing units are expected in 2005. Excluding housing used for seasonal and recreational purposes, vacancy rates in 2000 stood at 2.8% for owner-occupied housing and 8.5% for hotels and motels; the overall vacancy rate for all housing types was 7.0%.

TABLE 3.7-4 Personal Income (2005 dollars) within the ROI for the Northeast Reliability Interconnect

Parameter	1990	2002	Average Annual Growth Rates (%) 1990 to 2002	2005[a]
Hancock County				
Total personal income ($ millions)	1,288	1,666	2.2	1,800
Personal income per capita ($)	27,443	31,541	1.2	32,700
Penobscot County				
Total personal income ($ millions)	3,476	4,164	1.5	4,400
Personal income per capita ($)	23,713	28,801	1.6	30,200
Washington County				
Total personal income ($ millions)	715	818	1.1	900
personal income per capita ($)	20,244	24,298	1.5	25,400
ROI				
Total personal income ($ millions)	5,480	6,648	1.6	7,000
Personal income per capita ($)	23,800	28,213	1.4	29,400

[a] ANL projections.

Source: U.S. Department of Commerce (2005).

TABLE 3.7-5 Housing Characteristics within the ROI for the Northeast Reliability Interconnect

Parameter	1990	2000	2005[a]
Hancock County			
Owner occupied	13,876	16,550	16,700
Rental	4,466	5,314	5,400
Total unoccupied units	12,054	12,081	12,200
Total units	30,396	33,945	34,300
Penobscot County			
Owner occupied	37,679	40,554	40,500
Rental	16,384	17,542	17,500
Total unoccupied units	7,296	8,751	8,700
Total units	61,359	66,847	66,800
Washington County			
Owner occupied	10,568	10,969	10,900
Rental	2,850	3,149	3,100
Total unoccupied units	5,706	7,801	7,800
Total units	19,124	21,919	21,800
ROI			
Owner occupied	62,123	68,073	68,100
Rental	23,700	26,005	26,000
Total unoccupied units	25,056	28,633	28,700
Total units	110,879	122,711	122,900

[a] ANL projections.

Source: U.S. Bureau of the Census (2005a).

Within the ROI, over the period 1990 to 2000, housing growth in Hancock (1.1%) and Washington Counties (1.4%) was slightly higher than the ROI average of 1.0%, with a slightly lower-than-average rate for Penobscot County (0.9%). As a result of this growth, 3,549 were added in Hancock County, 5,488 in Penobscot County, and 2,795 in Washington County. On the basis of population data projections for 2005 and vacancy rates for 2000, 725 rental units in Hancock County are expected to be vacant in 2005, 756 in Penobscot County, and 1,623 in Washington County.

3.8 ENVIRONMENTAL JUSTICE CONSIDERATIONS

E.O. 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" (59 FR 7629, February 16, 1994) requires Federal agencies to incorporate environmental justice as part of their missions. Specifically, it directs these agencies to address, as appropriate, any disproportionately high and adverse human health or environmental effects of their actions, programs, or policies on minority and low-income populations.

The analysis of the impacts of the proposed project on environmental justice issues follows guidelines described in the Council on Environmental Quality's (CEQ's) *Environmental Justice Guidance under the National Environmental Policy Act* (CEQ 1997). The analysis method has three parts: (1) a description of the geographic distribution of low-income and minority populations in the affected area (discussed below); (2) an assessment of whether the impacts of construction and operation would produce impacts that are high and adverse (see Section 4.8, Environmental Justice Considerations); and (3) if impacts are high and adverse, a determination as to whether these impacts disproportionately impact minority and low-income populations (see Section 4.8, Environmental Justice Considerations).

The project area for the analysis of the impacts on minority and low-income populations was identified as about a 2-mi (3.2-km) zone along the alternative routes (1 mi [1.6 km] on either side of each route).[8] This zone is also roughly the area within which the potential impacts of the NRI would be most likely to affect the general population. These include noise, dust, and vehicle emissions during construction and electromagnetic field effects (EMF) during operations. A single zone was analyzed for the Modified Consolidated Corridors, the Consolidated Corridors, and the Previously Permitted Routes because of the close proximity of these three routes to each other, particularly within the populated areas. Although there may be visual impacts of the NRI on minority and low-income populations, it is unlikely that the potential impacts on these population groups would be any different from those impacts affecting the population as a whole. The analysis does not, therefore, consider a separate project area for the analysis of visual impacts to minority and low-income populations. The affected area for visual resources is described in Section 3.9.

A description of the geographic distribution of minority and low-income groups within the project area was based on demographic data from the 2000 Census (U.S. Bureau of the Census 2005a). The following definitions were used to define minority and low-income population groups:

- **Minority.** Persons are included in the minority category if they identify themselves as belonging to any of the following racial groups: (1) Hispanic, (2) Black (not of Hispanic origin) or African American, (3) American Indian or Alaska Native, (4) Asian, or (5) Native Hawaiian or Other Pacific Islander. Persons may classify themselves as being of multiple racial origins (up to six racial groups as the basis of their racial origins). The term minority includes all persons in the individual racial groups, as well as those classifying themselves in multiple racial categories, except those who classify themselves as not of Hispanic origin and as White or "Other Race" (U.S. Bureau of the Census 2005a).

- **Low-Income.** Individuals who fall below the poverty line are classified as low-income. The poverty line takes into account family size and age of

8 These dimensions have their origins in the practice of siting transmission lines, whereby a 2.0-mi (3.2-km)-wide corridor of uncertainty is typically selected for the working corridor width wherein a final transmission line route can be situated without the need for further regulatory review.

> individuals in the family. In 1999, for example, the poverty line for a family of five with three children below the age of 18 was $19,882 (U.S. Bureau of the Census 2005a). For any given family below the poverty line, all family members are considered as being below the poverty line for the purposes of analysis without consideration of individual income variations within the family.

The CEQ guidance cited above states that low-income and minority populations should be identified where either (1) the low-income or minority population of the affected area exceeds 50%, or (2) the low-income or minority population percentage of the affected area is meaningfully greater than the low-income or minority population percentage in the general population or other appropriate unit of geographic analysis.

This EIS applies both criteria in using the Census Bureau data for census block groups in the 2-mi (3.2-km) zone, wherein consideration is given to the low-income or minority population that is more than 50% or 20 percentage points higher than in the counties through which each route would pass (the reference geographic unit).

Data in Table 3.8-1 show the minority and low-income composition within the 2-mi (3.2-km) zone for the alternative routes on the basis of 2000 Census data and CEQ guidelines. Individuals identifying themselves as Hispanic are included in the table as a separate entry. However, as Hispanics can be of any race, this number also includes individuals identifying themselves as being a part of one or more of the other population groups listed in the table. Less than 3% of the population within the zone for the Modified Consolidated Corridors, Consolidated Corridors, and Previously Permitted Routes can be classified as minority, with almost 11% of the zone population classified as low-income. For the MEPCO South Route, less than 3% of the population in the zone can be classified as minority and a little more than 12% classified as low-income.

Figures 3.8-1 and 3.8-2 show the spatial distribution of the minority and low-income populations in Hancock, Penobscot, and Washington Counties, respectively. There are no census block groups within the 2-mi (3.2-km) zone of the Modified Consolidated Corridors, Consolidated Corridors, and Previously Permitted (No Action) Routes where the minority or low-income populations exceed 50% of the total population in the block group or where the minority or low-income populations exceed the state average by more than 20 percentage points. The MEPCO South Route would not intersect any low-income population census block groups, but would cross one minority population census block group.

3.9 VISUAL RESOURCES

The placement of support structures and other facilities, as well as ROW clearings, could affect the visual aesthetics of some areas, and thus impact the quality of recreational and other activities.

TABLE 3.8-1 Minority and Low-Income Population Characteristics in the Three-County Area of the Alternative Routes, 2000

Parameter	Modified Consolidated Corridors, Consolidated Corridors, and Previously Permitted Routes[a]		MEPCO South Routea	
	Census Block Groups Total	2-mile (3.2 km) Zone Total	Census Block Groups Total	2-mile (3.2 km) Zone Total
Minority Population[b]		Population Numbers		
1. Total population	52,555	7,709	107,116	9,101
2. White	51,073	7,494	104,161	8,851
3. Total minority	1,483	215	2,954	250
4. Hispanic or Latino	263	38	516	45
5. Not Hispanic or Latino	1,220	178	2,439	205
6. One race	860	125	1,619	134
7. Black or African American	141	24	308	27
8. American Indian or Alaska Native	423	51	721	55
9. Asian	253	42	499	44
10. Native Hawaiian or Other Pacific Islander	9	2	25	2
11. Other race	34	6	66	6
12. Two or more races	360	53	820	71
		Percentage by Area		
Minority within block group and zone	2.8	2.8	2.8	2.8
Minority within Hancock County	3.8		NA[c]	
Minority within Penobscot County	2.8		2.8	
Minority within Washington County	6.8		6.8	
		Population Numbers		
Low-Income Population	5,969	833	12,929	1,112
		Percentage by Area		
Low-income within block group and zone	11.4	10.8	12.1	12.2
Low-income within Hancock County	13.1		NA	
Low-income within Penobscot County	10.0		10.0	
Low-income within Washington County	18.5		18.5	

[a] Data were estimated by multiplying the total minority and low-income population in the census block groups through which each route would pass by the ratio of land area in the census block groups in the zone to total land area in the census block groups.

[b] Row 6 = Rows 7 + 8 + 9 + 10 + 11, Row 5 = Rows 6 + 12, Row 3 = Rows 4 + 5, Row 1 = Rows 2 + 3 (Totals may be different because of rounding errors).

[c] NA = not applicable; the route does not include this county.

Source: U.S. Bureau of the Census (2005a).

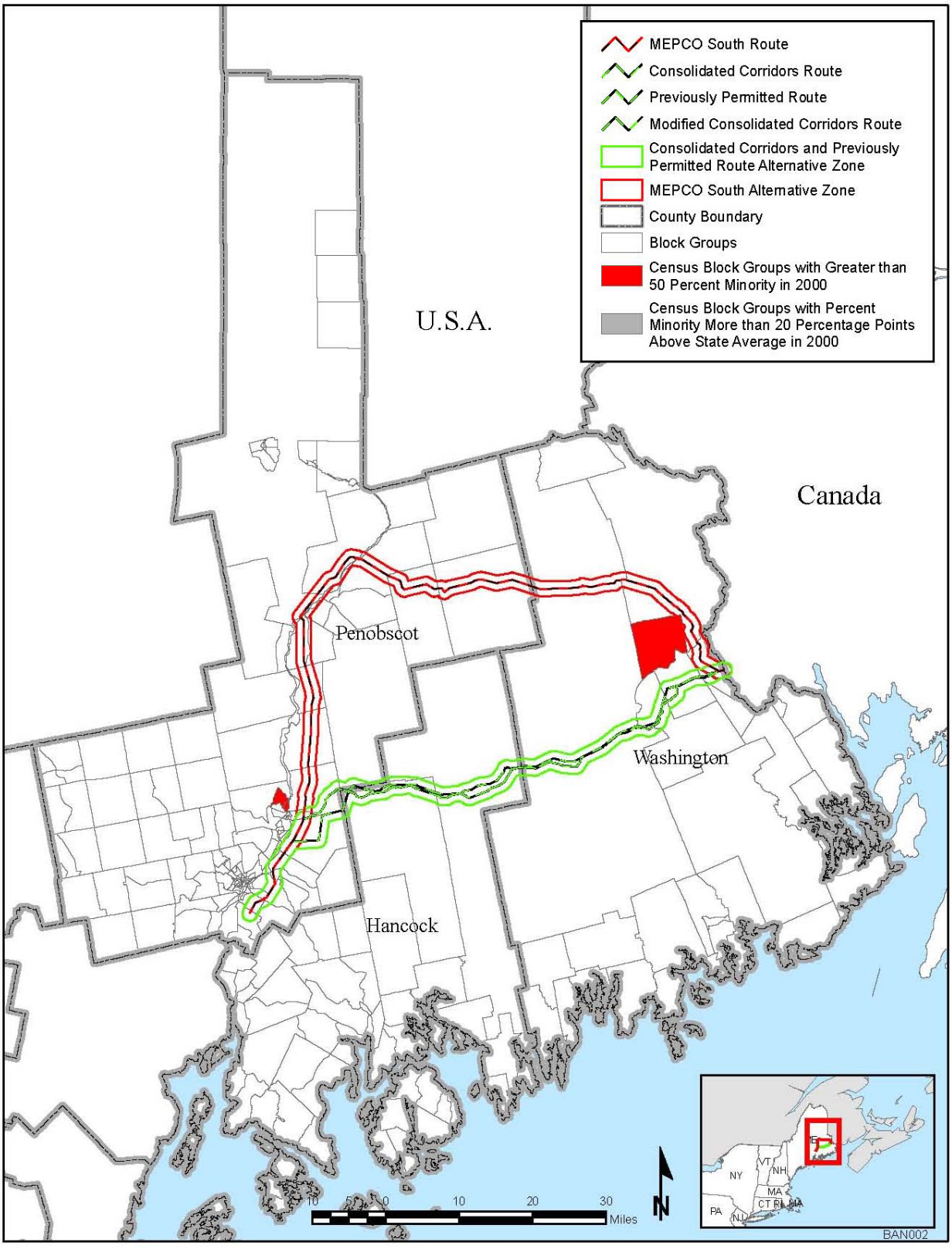

FIGURE 3.8-1 Minority Population Concentrations in Census Block Groups in Hancock, Penobscot, and Washington Counties (Source: U.S. Bureau of the Census 2005a)

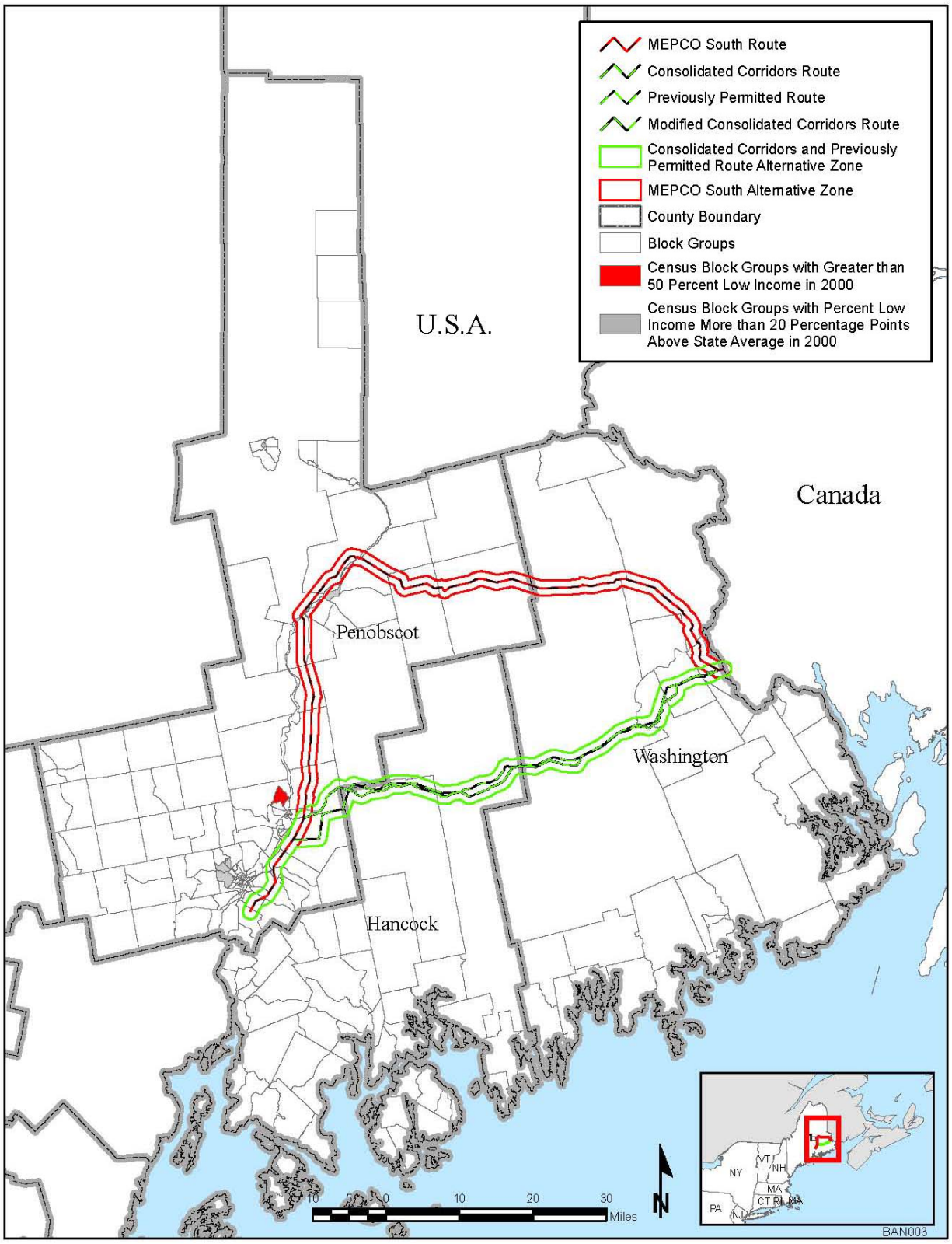

FIGURE 3.8-2 Low-Income Population Concentrations in Census Block Groups in Hancock, Penobscot, and Washington Counties (Source: U.S. Bureau of the Census 2005a)

3.9.1 Scenic Quality

For this EIS, a visual inventory of the areas through which each alternative route would pass was established. In the inventory, discrete areas were rated as (1) Class A (lands of outstanding or distinctive diversity or interest); (2) Class B (lands of common or average diversity or interest), or (3) Class C (lands of minimal diversity or interest). The classification for an area was based on landforms, vegetation, water, color, adjacent scenery, scarcity, and cultural modifications.

Much of the change in scenic quality as a result of past human activity along the southwestern portion of the Modified Consolidated Corridors, Consolidated Corridors, and Previously Permitted Routes occurs between the Orrington Substation and Great Works Stream (see Figure 2.1-2). The landscape in this area has undergone extensive man-made modifications associated with homes, roads, transmission lines, commercial developments, and farmlands (Figures H-1, H-3, and H-5, Appendix H). Similar but less significant changes in scenic quality occurred at the eastern end of these alternative routes, near Baileyville (Figure H-31, Appendix H). Other changes to the scenic quality in the area for these routes occurred as a result of the M&N gas pipeline ROW and Stud Mill Road, which often run parallel to each other through privately owned forested land from County Road on the eastern perimeter of the Sunkhaze Meadows National Wildlife Refuge to Baileyville (Figures H-7, H-9, H-11, and H-13, Appendix H). Various camps, gravel pits, logging roads and trails, and logged areas are also scattered in various locations across the area.

Other areas in the vicinity of the Modified Consolidated Corridors, Consolidated Corridors, and the Previously Permitted Routes are either pristine or relatively undisturbed, with few year-round residents. Recreational activities in these areas include fishing, hunting, canoeing, rafting, hiking, snowmobiling, and ATV use.

On the basis of these descriptors, the scenic quality of the area through which the Modified Consolidated Corridors, Consolidated Corridors, and Previously Permitted Routes would pass is rated as Class A for those few portions of the line not in close proximity to semiurban areas along Routes 1A and 2. The landscape is rated Class C in the vicinity of the semiurban areas and other areas where land has been disturbed.

The MEPCO South Route has numerous variations in scenic quality. In addition to the changes in scenic quality between the Orrington Substation and Great Works Stream described above, there are visual variations along Route 2 and Route 6 where the MEPCO South Route would be located close to residential and commercial developments. The route would be located close to the towns or municipalities of Brewer, Milford, Enfield, West End, Lincoln, Lee, Springfield, Carroll, Topsfield, and Waite. Although much of the remaining area along Route 2 and Route 6 is rural in character, there are very few pristine natural environments present. Extensive farmland, forestry activities, gravel pits, and access roads have changed the character of the visual environment. Portions of the MEPCO South Route would also follow existing transmission lines along the western and eastern ends of the route.

On the basis of these descriptors, the scenic quality of the area through which the MEPCO South Route would pass is rated as Class A for those portions of the line not in close proximity to semiurban areas. In the vicinity of the semiurban areas and other areas noted where land has been disturbed, the landscape is rated Class C.

3.9.2 Distance Zones

Because changes in form, line, color, and texture associated with changes in scenic quality become less perceptible with increasing distance to viewers, the distance zone in which the project is readily perceptible has an important influence on the overall visual impact of the project. Distance zones were applied to the visual environment of each alternative transmission line ROW. The foreground-middleground zone is the area between the viewer and a distance of 3 to 5 mi (5 to 8 km); the background zone includes the area from 3 to 5 mi (5 to 8 km) from the viewer up to 15 mi (24 km); and the seldom seen zone is the area greater than 15 mi (24 km) beyond any given viewing point. Because of the fairly uniform vegetation and featureless topography in the majority of the project area, the NRI would primarily be visible from only the foreground-middleground distance zone for all four alternative routes.

3.9.3 Visual Sensitivity

Public concern for change in scenic quality along the route is measured in terms of high, medium, or low sensitivity to changes in the landscape from key observation points. Sensitivity ratings for the NRI take into account the type of user, the amount of use, the level of public interest, adjacent land uses, and duration of time spent by the viewer along the alternative routes.

Table 3.9-1 presents key observation points along each alternative route where the transmission line could be seen.[9] Photographs of all but two locations identified in Table 3.9-1 are presented in Appendix H.

The southwestern section of each alternative route; portions of the MEPCO South Route close to Milford, Enfield, West End, Lincoln, Lee, Springfield, Carroll, Topsfield, and Waite; and portions of each alternative route close to Baileyville have been substantially altered by human activity (e.g., homes, roads, and industrial and commercial activities). Because the landscape features are not unique, the visual sensitivity for these portions of the project area can be classified as low.

The majority of the alternative routes (other than those areas mentioned above) would be located in isolated areas with few year-round residents. Although there is a moderate level of recreational use of these areas, many of these recreational activities occur in areas that are either

9 A key observation point is a point located along a commonly traveled route or other likely observation point where the angle of observation, number of viewers, length of viewing times, relative project size, season of use, and light conditions make the transmission line highly visible to the public.

TABLE 3.9-1 Key Observation Points, Use Rates, and Viewer Sensitivity Data for the Alternative Routes

Key Observation Point[a]	Location	Use Rates	Visual Sensitivity[b]	Appendix H Figure
Modified Consolidated Corridors, Consolidated Corridors, and Previously Permitted Routes				
Route 1A Crossing	Near Brewer	20,640[c]	L	H-1
Eastern Avenue Crossing	Near Holden Center	<500[d]	L	H-3
Route 9 Crossing	Near Eddington	6,090[c]	L	H-5
Eagle Mountain	Near Stud Mill Road	<50[e]	H	H-7
Stud Mill Road	Near Jimmies Mountain	<50[e]	H	H-9
Machias River Crossing	Stud Mill Road	<50[e]	H	H-11
Pocomoonshine Lake	Near Stud Mill Road	<50[e]	H	H-13
Route 1 Crossing	Baileyville	5,940[d]	M	NA[f]
St. Croix River Crossing	North of Baileyville	<50[e]	H	H-15
MEPCO South Route				
Route 1A Crossing	Near Brewer	20,640[c]	L	H-1
Eastern Avenue Crossing	Near Holden Center	<500[d]	L	H-3
Route 9 Crossing	Near Eddington	6,090[c]	L	H-5
Stud Mill Road Crossing	North of Bangor	<50[e]	M	H-17
Route 2 Crossing	Southwest of Lincoln	3,250[d]	M	H-19
Penobscot River Crossing	South of Lincoln	<50[e]	H	H-21
Route 2 Crossing	Northeast of Lincoln	6,240[d]	M	H-23
Route 6 Crossing	West of Springfield	3,040[d]	M	H-25
Route 6 Crossing	East of Carroll	1,150[d]	M	H-27
Route 6 Crossing	West of Topsfield	1,420[d]	M	H-29
Route 1 Crossing	South of Topsfield	2,150[d]	M	H-31
Grand Falls Flowage Crossing	Northeast of Baileyville	<50[e]	H	NA
St. Croix River Crossing	North of Baileyville	<50[e]	H	H-15

[a] A key observation point is a point located along a commonly traveled route or other likely observation point where the angle of observation, number of viewers, length of viewing time, relative project size, season of use, and light conditions make the transmission line highly visible to the public. Appendix H includes photographs and photosimulations from most of the key observation points.

[b] H = high, M = medium, L = low.

[c] Annual average daily traffic counts for 2003 (DOT 2005).

[d] Annual average daily traffic counts for 1999 (DOT 2005).

[e] Data show daily visitation rates for 2004 (Hall 2005).

[f] NA = not available

pristine or relatively undisturbed by human activity. Recreational activities include fishing, hunting, canoeing, rafting, hiking, and ATV use. Other local activities are limited to those related to agriculture, forestry, transportation, and gas pipeline facilities. Although only a relatively small number of people visit these portions of the route corridors, the uniqueness of the landscape features is sufficiently high to potentially result in a high level of visual sensitivity to the transmission line.